

SPECIFIC MEMORANDUM OF AGREEMENT
BETWEEN
THE UNITED STATES DEPARTMENT OF ENERGY
AND
THE POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION OF JAPAN
FOR
THE DEVELOPMENT OF FUELS AND MATERIALS
FOR LIQUID METAL REACTORS

Whereas the United States Department of Energy (DOE) and the Power Reactor and Nuclear Fuel Development Corporation (PNC) of Japan (hereinafter referred to as "the Parties"), have agreed to cooperate under the Agreement between the United States Department of Energy and the Power Reactor and Nuclear Fuel Development Corporation of Japan in the Field of Liquid Metal Cooled Fast Breeder Reactors of January 31, 1979 (hereinafter referred to as "the LMFBFR Agreement");

Whereas the Parties recognize the merits of collaboration to avoid unnecessary duplication of effort and to make best use of each Party's expertise with a view to advancing the state of liquid metal reactor development to a stage where it is a demonstrated economical and commercially viable option;

Whereas the Parties are each conducting programs to develop core systems (fuels, blankets, and absorbers) for current and future fast reactors;

Whereas the Parties believe that collaboration on the development of fuels and materials for liquid metal reactors would be of significant benefit to both Parties,

DOE and PNC herein agree to a Specific Memorandum of Agreement (SMA) to be known as the "Fuels and Materials Development SMA," as follows:

ARTICLE 1

General Provisions

1.1 The objectives of this SMA are:

- a. to integrate selected Fuels and Materials development activities of DOE and PNC in order to achieve the maximum productivity from the available technical, facility and financial resources;
- b. to develop a sound technical basis for the design of long-life, economical liquid metal reactor core systems (fuel, blanket and absorber);
- c. to develop improved liquid metal reactor core systems which permit reactor operation at higher levels of thermal efficiency and reduced electrical generation costs.

1.2 This cooperation shall be a joint project under and as envisaged in the LMFBR Agreement.

1.3 This SMA shall be subject to the terms and conditions of the Agreement for Cooperation between the U.S. and Japan concerning Civil Uses of Atomic Energy.

ARTICLE 2

Program

2.1 The program of cooperation under this Fuels and Materials Development SMA (hereinafter referred to as "the Fuels & Materials Development Program") shall cover two areas, namely, Long-life Core Systems and Fuel Fabrication.

2.2 Cooperation in the area of Long-life Core Systems shall consist of the following activities:

2.2.1 Materials Development. DOE and PNC shall jointly develop materials for applications in long-life core systems. In general, DOE shall provide long-term irradiation services in the Materials Open Test Assembly (MOTA) irradiation vehicle of the Fast Flux Test Facility (FFTF) and PNC shall fabricate materials for testing in MOTA. Appendix A to this SMA details the responsibilities of the Parties for this activity.

2.2.2 MONJU Fuels Irradiations in FFTF. DOE and PNC shall jointly design and perform irradiation tests of up to six MONJU fuel assemblies using PNC supplied stainless steel and advanced austenitic stainless steel. DOE shall provide the Special Nuclear Materials and fabricate the test assemblies with PNC financial support, and shall irradiate these assemblies in FFTF. Appendix B to this SMA details the responsibilities of the Parties for this activity.

2.2.3 Long-life Fuel Irradiation in FFTF. Two long-life fuel assemblies utilizing advanced high-strength ferritic steel cladding are to be fabricated by DOE, with PNC financial support. The Phase I test shall utilize DOE-origin cladding material (dispersion-strengthened alloy). The Phase II test is to utilize PNC-origin cladding material (ferritic alloy). DOE shall provide all Special Nuclear Materials for both test assemblies and the necessary FFTF irradiation testing services for performance testing of both fuel assemblies. Appendix C to this SMA details the responsibilities of the Parties for this activity.

2.2.4 Long-life Fuel Irradiations in JOYO. DOE shall provide US-origin high-strength ferritic stainless steel cladding tubes to be used by PNC in fabricating fuel pins for a joint test in JOYO in order to obtain data on long-life fuel pin performance under conditions of reduced linear power. PNC shall provide all Special Nuclear Materials and the long-term JOYO irradiation testing services necessary for the test. Appendix D to this SMA details the responsibilities of the Parties for this activity.

2.2.5 Long life Blanket Assembly Irradiation in FFTF. DOE and PNC shall jointly test in FFTF two long-life blanket assemblies. DOE shall fabricate the two long-life blanket test assemblies, with PNC financial support, in accordance with mutually agreed-upon specifications. The first blanket test assembly shall be prototypical of a MONJU blanket assembly and shall utilize PNC-supplied modified 316 stainless steel. The second blanket test assembly shall utilize DOE-origin dispersion-strengthened ferritic alloy cladding material. DOE shall provide all Source Materials and the necessary FFTF irradiation testing services. Appendix E to this SMA details the responsibilities of the Parties for this activity.

2.3 Cooperation in the area of Fuel Fabrication shall consist of the following activities:

2.3.1 Development of Improved Fuel Specifications. DOE and PNC shall collaborate on the evaluation of the results of the C-1 test in the FFTF (burnup level of more than 90,000 MWD/MTM), the C1J test in JOYO (burnup level of about 30,000 MWD/MTM), and the C5J test in JOYO in order to develop improved fuel specifications for breeder reactors. In accordance with direction from the DOE/PNC Fuels and Materials Working Group of Article III, DOE and PNC shall divide post-irradiation evaluation (PIE) responsibilities of fuel pins irradiated in the FFTF C-1 test. Appendix F to this SMA details the responsibilities of the Parties for this activity.

2.3.2 Other areas concerned with the exchange of fuel fabrication technology as may be mutually agreed in writing by the Parties.

ARTICLE 3

Management

3.1 The DOE/PNC Fuels and Materials Working Group shall manage the Fuels and Materials Development Program subject to the provisions of Article 4.3 of the LMFBR Agreement.

3.2 The DOE/PNC Fuels and Materials Working Group shall report annually to the Joint Coordinating Committee on activities conducted under this SMA during the previous year for review, evaluation and assessment of the Fuels and Materials Development Program. Each Working Group Head shall appoint two Technical Coordinators to manage the day-to-day activities under the Fuels and Materials Development Program, one for the area of Long-life Core Systems and the other for the area of Fuel Fabrication.

3.3 The Technical Coordinators must have the approval of the DOE/PNC Fuels and Materials Working Group for any technical modifications within the scope of the Fuels and Materials Development Program.

ARTICLE 4

Participation

Representatives from agencies and departments of the Governments of Japan and the United States, prime or subcontractors and licensees to DOE and PNC, reactor manufacturers and utilities of Japan and the United States may be invited to participate in discussions and meetings arranged under this SMA. Each of the Parties shall be responsible for ensuring that the participants shall follow the laws and regulations of their respective countries and the terms and conditions of this SMA.

ARTICLE 5

Transfer of Plutonium

The plutonium and depleted uranium to be incorporated in FFTF testing within the scope of the activities of Article II shall be provided by DOE. Upon completion of irradiation and preparation for shipment of irradiated fuel or blanket pins to PNC for post-irradiation examination, an amount of plutonium equivalent to that contained in the shipment shall be transferred from PNC to DOE in the form of separated material. This requirement shall be waived if agreement is reached in writing between the Parties prior to shipment of irradiated pins from DOE to PNC for the return of all fissile and fertile material involved to DOE at the conclusion of post-irradiation examination by PNC, or by some other accommodation mutually agreed upon in writing by the Parties. In no event shall the total amount of plutonium contained in the aggregate of shipments to PNC under Article II exceed five (5) kilograms.

ARTICLE 6

Incorporation by Reference

Articles 7, 11, 13, 14, and, except as otherwise provided in the appendices, 15 of the LMFBR Agreement are hereby incorporated by reference.

ARTICLE 7

Information

7.1 The Parties shall exchange scientific and technical information under this SMA necessary to carry out the Fuels and Materials Development program. Such information shall be limited to that which they have the right to disclose, either in their possession or available to them. All information arising from this SMA shall be promptly exchanged between the Parties. All information shall be provided in the English language, unless translations represent an unreasonable burden on the transmitting Party, as determined by the DOE/PNC Fuels and Materials Working Group.

7.2 Information exchanged under this SMA, except as noted in paragraph 7.3 of this Article, may be made available to the public by either Party through customary channels and in accordance with normal procedures of the Parties.

7.3 Proprietary information shall not be accepted for or utilized in the Fuels and Materials Development Program without the express written approval of DOE and PNC. For the purposes of this SMA, proprietary information shall mean information of a confidential nature such as trade secrets and know-how (for example, computer programs, design procedures and techniques, chemical composition of materials, or manufacturing methods, processes or treatments) made available hereunder and acquired by either Party prior to, or outside, the course of the activities under this SMA, and bearing a restrictive designation, provided such information:

- a. has been held in confidence by its owner;
- b. is of a type which is customarily held in confidence by its owner;
- c. has not been transmitted by the transmitting Party to other entities (including the receiving Party) except on the basis that it is to be held in confidence; and
- d. is not otherwise available to the receiving Party from another source without restriction on its further dissemination.

It shall be the responsibility of the Party supplying proprietary information to identify the information as such and to ensure that it is appropriately marked.

7.4 Information transmitted by one Party to the other Party under this SMA shall be accurate to the best knowledge and belief of the transmitting Party, but the transmitting Party does not warrant the suitability of the information transmitted for any particular use or application by the receiving Party or by any third Party. Information developed jointly by the Parties shall be accurate to the best knowledge and belief of both Parties. Neither Party warrants the accuracy of the jointly developed information or its suitability for any particular use or application by either Party or by any third Party.

ARTICLE 8

Patents

8.1. Any invention or discovery made or conceived in the course of or under the Fuels and Materials Development Program under this SMA (hereinafter referred to as "arising inventions") shall be identified and reported promptly by DOE to PNC for activities in DOE's facilities and by PNC to DOE for activities in PNC's facilities. Information regarding inventions on which patent protection is to be obtained shall not be published or publicly disclosed by the Parties until a patent application has been filed in either country of the Parties, provided, however, that this restriction on publication or disclosure shall not extend beyond six

months from the date of reporting of the invention. It shall be the responsibility of DOE or PNC to appropriately mark reports which disclose inventions that have not been appropriately protected by the filing of a patent application.

8.2 Arising inventions shall be owned (1) by PNC in Japan, subject to a royalty-free, nonexclusive, irrevocable license to DOE, its Government, and its nationals of its country designated by it and (2) by DOE in the United States and third countries, subject to a royalty-free, nonexclusive, irrevocable license to PNC, its Government, and the nationals of its country designated by it. In the event a Party decides not to obtain all rights and interests in an arising invention in its own country or a third country, the other Party may do so, subject to a royalty-free, nonexclusive, irrevocable license to the first Party, its Government and the nationals of its country designated by it.

8.3 This Article shall apply mutatis mutandis to the protection of utility model and of design.

8.4 Each Party shall, without prejudice to any rights of inventors or authors under its national laws, take all necessary steps to provide the cooperation from its inventors or authors required to carry out the provisions of this Article and Article 7. Each Party shall assume the responsibility to pay awards and compensation required to be paid to its own nationals according to its own laws.

ARTICLE 9

Duration and Amendment

9.1 This SMA shall enter into force upon signature by both Parties and shall continue until March 31, 1992.

9.2 All activities not completed at the expiration of this SMA may be continued until their completion under the terms of this SMA.

9.3 This SMA may be amended or extended at any time by mutual agreement of the Parties in writing.

9.4 Either Party may terminate this SMA in whole or in part by giving the other Party six months prior written notification: (1) in the case that Government approval of activities under the Fuels and Materials Development Program set forth in this SMA is not granted; (2) in the case that appropriation of funds necessary for performance of activities under the Fuels and Materials Development Program is not obtained; (3) in the case of any failure in performance by either Party due to any cause arising from or attributable to acts, events, omissions, accidents, or Acts of God beyond the reasonable control of the Party to perform. Such termination shall be without prejudice to the rights which may have accrued under this SMA to either Party up to the date of such termination, and neither Party shall be liable for loss suffered by the other Party by the termination.

Lyne Clancy
For the United States
Department of Energy

for

Kiyoshi Iwama
For the Power Reactor and
Nuclear Fuel Development
Corporation of Japan